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ABSTRACT

One of 15 members of the Northern Illinois Learning Resources Cooperative (NILRC), Elgin Community College served as host institution for a project to design, develop, test, and install computer programs in a community college resource center environment. The service functions identified for systems development included circulation, serial holdings, equipment scheduling, materials preview and rental control, and media production. The development for the project took place within an IBM technical environment (Model 370/125 computer) and is designed for ease of transfer to other medium-sized or larger IBM computer systems. Special technical features include modular programming, COBOL coding, online documentation and programming, database management system design (DL/1), CICS teleprocessing with command level coding, and the extensive use of tables in the system design. The project report includes results of the activities, problems encountered, and extensive appendices. (Author/MER)

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Final Report

Project No. 475AH70136
Grant No. G007702306

Research and Demonstration for a Comprehensive Package of Computer Programs to Serve Community College Learning Resource Centers

Submitted by Jack A. Weiss, Project Director

Jack Weiss
(Signature)

Elgin Community College

Elgin, Illinois

BEST COPY AVAILABLE

June, 1980

The activity which is the subject of this report was supported in whole or in part by the U.S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred.

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HEALTH, EDUCATION, AND WELFARE

Office of Education
Office of Libraries and Learning Resources

ABSTRACT

This report describes the first phase of a research and development project which took place within a consortium of community college learning resource centers. The purpose of the project was to develop, evaluate, demonstrate, and disseminate a comprehensive package of computer programs designed to provide greater efficiency of operations and improved service to users of community college LRC's. The service functions identified for systems development included circulation, serial holdings, equipment scheduling, materials preview and rental control, and media production.

Research and development for this project was made possible through funding support from the U.S. Department of Health, Education, and Welfare, Office of Education, Office of Libraries and Learning Resources. As one of the fourteen members of the Northern Illinois Learning Resources Cooperative (NILRC), Elgin Community College was instrumental in obtaining funding and served as the host institution for the project.

The development for this project took place within an IBM technical environment (Model 370/125 computer) and is designed for ease of transfer to other medium-sized or larger IBM computer systems. Special technical features included modular programming, COBOL coding, online documentation and programming, data base management system design (DL/1), CICS teleprocessing with command level coding, and the extensive use of tables in the systems design.

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INTRODUCTION

Purpose and Organization of Final Report

The purpose of this report is to describe the project titled "Research and Demonstration for a Comprehensive Package of Computer Programs to Serve Community College Learning Resource Centers." The major goal of the project was the design, development, testing and installation of computer programs related to a community college learning resource center environment. The project received continued funding for an additional phase of project activity which is still in progress at the time of this writing. Thus, this report might be more appropriately considered as a snapshot or a status report at a given point in time (May, 1979), rather than as an exhaustive cumulative report. While some overlap in reporting is unavoidable, every attempt has been made to draft this narrative according to the status of the project as of this May, 1979 date.

Because of the nature of research associated with this project, the report emphasizes the description of specific developmental activities. The major part of the body of the report pertains to the "Results" section. Those areas which were thought to be of particular value in contributing to the body of knowledge in the field of library automation were emphasized in the narrative of this section. Since systems documentation is voluminous, the appendix was purposely limited to brief illustrative samples to enhance clarity and overall usefulness of this final report.

Background and Objectives for the Study

Project activities were conducted under the auspices of the Northern Illinois Learning Resources Cooperative (NILRC), a consortium of fifteen community colleges in the Chicago area (see Table 1). As a founding member of the NILRC consortium, Elgin Community College was instrumental in obtaining funding for the project and served as the host institution and test site for the system. The director of learning resources at Elgin Community College served as the project director.

The cooperative activities of NILRC pointed to the common LRC automation needs of consortium members. As might be expected, the overall mission and scope of LRC services were found to be similar among NILRC members. Operational LRC computer programs, most of which were batch operations with limited design and transfer features, existed at most NILRC schools. Also similar were the data processing services at each community college with comparable equipment and experienced personnel. Thus, library and

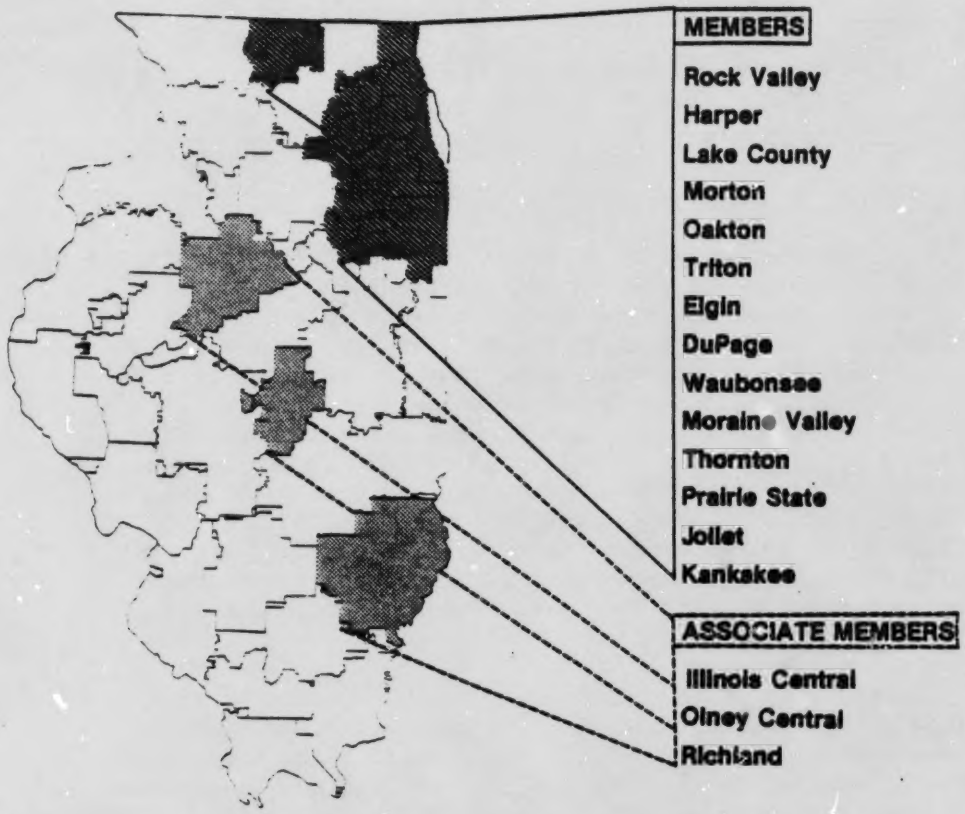

Table 1 - Geographic Location of NILRC

data processing professionals were available within the consortium to aid in project design and development activities. A conscious group decision was made to follow a design strategy which capitalized on using these existing in-house computer services rather than "stand-alone" computers in the LRC's or a single shared computer. Specific objectives for the project year were:

- To complete an intensive inventory to determine specific programming requirements at the nine consortium colleges.

- To develop and document six automated online table-driver computer programs (circulation control system, technical services and information retrieval system, serials holdings system, prieview and rental control system, equipment circulation, maintenance and inventory and production records system).

- To test the six automated programs at the consortium colleges.

- To conduct three national workshops (at member institutions) to demonstrate the use of the automated system.

- To disseminate the demonstration results and computer program through commercial and non-commercial agencies.

- To conduct one formative and one summative project evaluation.

METHODS AND PROCEDURES RELATED TO PROJECT DESIGN AND DEVELOPMENT

Explanation of Design, Development, Programming, and Testing

It was noted in the interim reports that research and development for this project were taking place within an extremely short time frame. Given this constraint, the project management plan attempted to take maximum advantage of the resources of advisory committee members and consultants, joining with project staff in a team effort that emphasized communications. With this approach to project management, phases of design, development, programming, and testing often overlapped. Rather than viewing each as a discrete process, project staff often combined steps to expedite the system development.

This approach characterized the earlier stages of design and development. Relying heavily on the benefits of online documentation (described more completely in the section titled "System Documentation"), the advisory committee often met in intensive work sessions for the purpose of:

- Drafting and clarifying functional requirements in the light of overall conceptual design, local computer system constraints, systems overhead, and impact upon other computer applications

- Designing screen displays and batch reports

- Identifying data elements including the assignment of field lengths and logical relationship of each to other data elements within the overall systems design.

The project director has frequently acknowledged the contributions of all members of the advisory committee who took part in this process. Most individuals travelled long distances at their own expense, and worked on their own time, during the early stage of project activity. While the project

was characterized by collaborative design and development, the project director and systems analyst carefully monitored activities to revise PERT charts and personnel assignments as necessary. In this regard, the most important management task was that of coordination of activities to minimize (or eliminate) the impact of unforseen problems on the momentum of the project.

Needs Assessment at NILRC Member Colleges

A survey was conducted in learning resource centers of NILRC member institutions prior to the inception of the project. Its purpose was to assess the status of automated service and to provide part of the rationale upon which the funding proposal was based. In addition to providing a valuable index of experience and services related to LRC automation, the survey highlighted some of the problems which had plagued automation efforts, including:

- Higher priority for local programming devoted to other institutional needs (i.e., bills and payroll, student registration, etc.)

- Staffing was limited in both breadth and depth, consequently computer programming could not be implemented by LRC staff alone.

- Exchange of existing programs between institutions was hampered by poor documentation and inconsistency of file structure. (Existing programs often were written by students from data processing classes.) While being helpful, these piecemeal programs were developed in a random manner, and, consequently, had limited transferability.

- Prior to the establishment of NILRC, only limited attention was given to cooperative solution of learning resources problems. No institution (or group of institutions) had approached the problem with a comprehensive plan of action, or had viewed the solution to this problem in a comprehensive, integrated manner.

One of the first tasks of the project systems analyst was a further assessment of needs for individual consortium members. The systems analyst and project director visited each of the eleven NILRC member colleges (Several institutions have since joined NILRC and the group now totals 14 members and 3 associate members.), and met with LRC staffs and directors of data processing. The format for visits was informal and allowed the project director to discuss the conceptual intent of the project and explain each college's role in the project. The visits also provided the systems analyst with an opportunity to ask specific questions of LRC staff members and tour the facilities at each institution. Thus a great deal of specific information was gathered about policies, procedures, and services at each individual campus.

Research Related to Other Systems

In addition to studying needs and gathering data from NILRC institutions, the project staff conducted an extensive national search for computer programs that might lend support to project programming. The goal of this activity was to gather information of already existing programs which might speed project design and development activities. Steps in the process included a review of the literature (not limited just to library applications), numerous telephone contacts, attendance at demonstrations of systems, and hosting of systems demonstrations. At one point, data processing staff at Elgin Community College installed and tested a package of computer programs used for circulation at another community college with the hope that modules of programming might be used for this project.

Correspondence, demonstrations, and phone conversations included contacts with the following agencies, institutions, and commercial software companies:

- St. Louis Junior College
- Cincinnati Electronics
- University of Illinois
- Northwestern University
- East Brunswick Library
- San Antonio Junior College
- University of Chicago
- C. L. Systems, Inc.
- Data Phase, Inc.
- Research Technology, Inc.
- National Medical Audiovisual Center

While the staff was open to any suggestion that might save time or minimize new development activity (and the cost of programming), it also examined each possibility with regard to the constraints of the conceptual design envisioned by NILRC institutions. Based on this review, it was determined that design and development would, of necessity, be limited to a local NILRC effort.

Role of NILRC Advisory Committee

The NILRC advisory committee played a major role in project design and development. Members of the committee represented a broad range of expertise including administration, data processing, library science, instructional development, media production and classroom teaching. This healthy blend of professional experience was one of the factors related to the success of NILRC and was certainly an asset to the project. The following people were represented on the NILRC advisory committee:

Ethel B. Apple	-	Elgin Community College
William Carlborg	-	Prairie State College
Bart Carlson	-	College of DuPage
Joe Chambers	-	Triton College
Don Dimond	-	Elgin Community College
Gary Fraser	-	Waubonsee Community College
Mary Lou Lowery	-	Triton College
Linda McEwan	-	Elgin Community College
John Putz	-	Elgin Community College
Gary Sabin	-	Oakton Community College
Vicky Smith	-	Moraine Valley Community College
Robert Veihman	-	College of DuPage
Robert Walsh	-	Moraine Valley Community College

During the months of February through May, 1978, members of this committee and consultants took part in over twenty-seven meetings to design screen displays and to develop requirements that would guide system design. This group was also responsible for assisting with identification of the needs and format of batch reports, notices, and statistics.

The Advisory Committee meetings usually required commitment of an entire workday, lengthy "homework" assignments, and extensive travel at the members' own expense. Attendance was always high and committee members exhibited an impressive spirit of cooperation and follow-through on their work. One additional comment that might be made about the NILRC advisory committee was its role in obtaining and sharing reference material, i.e., an online DL/1 course and library automation research materials.

Use of Consultants

Outside consultants were used whenever possible to provide advice and special services for the project. Given the breadth of the research and development task, and the limited staff available to the project on a full-time basis, the decision to take advantage of these services seemed advisable. This decision was further motivated by the fact that many of the critical decisions related to systems design were based upon new conceptual approaches or technologies.

Special Systems, Inc., from Silver Springs, Maryland, was hired to conduct a feasibility study regarding interfacing of bar code technology with IBM terminals. An independent consultant, Mr. Rob McGee, provided assistance to the project director with aspects of project management, and to the NILRC advisory committee with the study of machine-readable identification systems. Mr. Homer Ruby, from Northern Illinois University, assisted with decisions related to utilizing Library of Congress MARC records. While not employed directly as consultants, other individuals or groups were especially generous of their time in responsing to questions from project staff. Included among this group were Dr. James Aagard and Ms. Velma Veneziano, from Northwestern University, and Bernard J. Segel, from the Library of Congress. Hardware and software vendors, too, were particularly valuable as sources of information.

One of the problems identified in interim reports was the need to obtain additional programming assistance. The project director sought and obtained permission to obtain this programming through an outside service bureau, Kirtley Consulting Services. While these outside programming services were considerably more expensive (on an hourly basis), they were, in fact, cost effective in the long run. Such consulting services were not plagued with the "learning curve" problem and were found to be very efficient in completing the tasks assigned.

Staffing

Four positions were identified as necessary for successful completion of the various tasks associated with this project. These positions, with general descriptions of responsibilities, are listed below:

PROJECT DIRECTOR
Responsible for overall planning, coordination, evaluation, and reporting activity related to the project.

PROJECT TECHNICAL DIRECTOR
Responsible for working with project director to coordinate hardware and software support services which affected system development.

PROJECT SYSTEMS ANALYST
Responsible for gathering and analyzing information necessary to develop system specifications. Worked with technical director in the development of system specifications within the constraints of the technical environment. Supervised work of project programmers.

PROJECT PROGRAMMERS
Developed program logic according to specifications of systems analyst. Coded and tested programs. Completed documentation as necessary to fulfill reporting requirements.

The project was also supported by consultants, advisory committee members and special LRC services in the host institution. This support service included professional librarians and media people, clerical people, and graphics support people. All of this personnel support (with the exception of the systems analyst and programmers) was planned as "in-kind" contribution from the NILRC consortium and host institution.

Selection of qualified full-time personnel was a major initial problem and a continuing one throughout the project. Having been identified as a problem, this issue is discussed further in the "Problems Encountered" section. It was difficult to identify programmers whose technical skills matched the requirements and who were willing to join the project for such a relatively short time at the salaries offered. Thus, the only full-time staff member hired for the duration of the funding period was the project systems analyst. Ms. Dee Brooks was hired following a national search for a systems analyst. She brought to the project professional skill in both data processing and library science. It should be stated that Ms. Brooks carried responsibilities significantly greater than had been anticipated for this position, particularly in the area of personnel management and supervision. With initial programming starting approximately five months after the inception of the project, an arrangement was made which allowed released time from data processing staff members at Elgin Community College for work on the project. Programming services were also purchased on a part-time basis, both from individuals and from service bureaus and programming consulting services (See section titled "Use of Consultants").

Nature of Formative Evaluation

Evaluation is an important component of any research and development project. Given the continuation of the project through an award of additional funding for Phase II, most of the evaluation was formative in nature. Formative evaluation emphasizes processes and short-term outputs which result during the project year. Its value to the project was that it served as a vehicle for continual assessment and thus allowed staff to modify goals and priorities in response to unanticipated problems. The result was that momentum could be maintained on important project activities.

Attention was directed towards evaluation of the following areas: progress on objectives, software development, financial monitoring, and reporting functions. This report is, in itself, a form of evaluation with discussions of these topics included under various sections in the report.

RESULTS

Overview of First Phase of Project Activity

With the completion of the first phase of project activity, the system design was well established. The NILRC advisory committee and outside consultants assisted project staff in arriving at several important decisions about the technical environment within which the system would operate. The advisory committee also assisted project staff in developing functional requirements and specifications for the system. Using the specifications, the project staff made decisions regarding the logical structure of data bases. The important issues of response time, system efficiency and overhead were taken into account in developing the data bases and programming specifications. Related to system design were a number of operational questions. Especially important among these were item identification and methods of conversion.

Programming and testing were well under way with major attention directed toward online activities. Conversion and circulation routines were given the highest priority. The staff successfully completed a test of conversion programs using the Library of Congress as a "service bureau" for conversion. Selected modules of computer programs were completed and were in a testing stage. Batch programs necessary to support these online routines were completed or were in a testing stage.

Documentation was identified as one of the important project objectives, and the staff chose to use a software package called SPM II to facilitate online documentation. An explanation of the features of SPM II and discussion of its contribution to the project are described in the section titled "Significant Design Considerations." In addition to facilitating the design and development process, online documentation also provided a file of information from which dissemination materials could be prepared.

With the early part of the project devoted to design and development, dissemination activities were just starting at the end of the funding period. Visits and system demonstrations were purposely grouped to minimize negative impact on programming and testing activities. A slide series was prepared for use in local demonstrations and for future presentations at conferences. Printed materials were planned but not completed at the end of the project funding period.

Significant Design Considerations

Feedback from the project advisory committee and outside consultants led staff to the conclusion that the overall technical design of the project had to be one system rather than five or six separate systems. The project staff chose to dedicate the time required to design such a system under a data base management system (DBMS) philosophy to ensure a future looking design. The magnitude of this decision was significant in that it required commitments of time far in excess of what was originally planned for the advisory committee members and project staff. It should be noted that design under a DBMS philosophy demands a global look at applications; i.e., the committee had to keep in mind the future potential of bibliographic control, acquisitions, online catalogs, and user interface modules.

The data base management system has a number of valuable features, including:

- Flexibility with respect to new technological developments and peripheral equipment.
- Ease of programming for new applications with minimal interruption of current operations.
- Increased productivity of programmers with improved cost effectiveness in the area of personnel.
- Improved analytical tools for satisfying management information needs.
- Elimination of duplicate files allowing multiple uses of single data bases with immediate update capabilities.

The data base concept is graphically illustrated in Table 2.

The system was designed to be "table" or "parameter" driven when possible. This feature facilitates implementation and installation, allowing an institution to easily integrate existing procedures and eliminating programming changes.

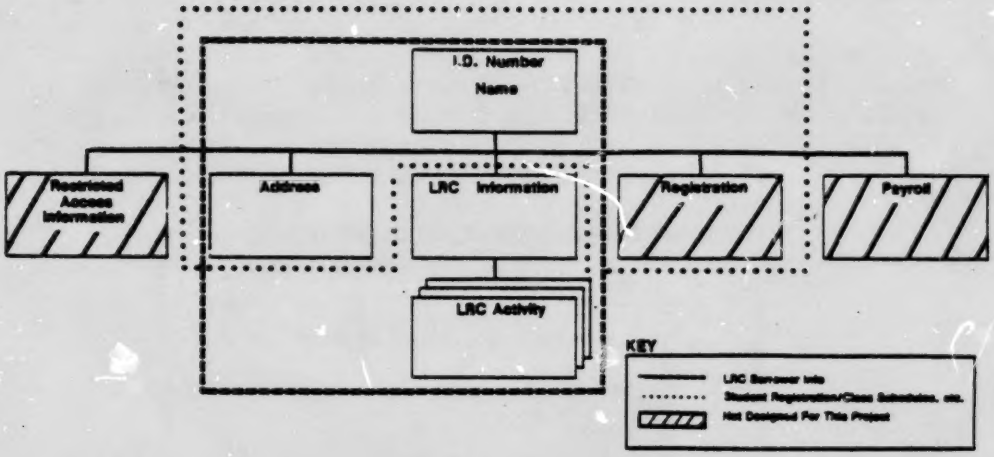

Table 2 - Data Base Concept

Thus an institution would include in these tables the information pertaining to their policies so that, without changing any of the programs, this system would reflect their local institutional needs. For example, the table used to drive the circulation programs uses five other tables, allowing the LRC to individualize circulation policies, basing them on type of borrower, status, type, location and sub-location of material. A simplified example of this is shown in Table 3. These tables can be easily updated to reflect any change in policy.

Complete documentation was identified as one of the major goals of the project. All documentation and programming was done online for ease of information dissemination and system transferability from one institution to another. The commercially-available software package used for this service is called SPM II. Features of SPM II include:

- Online creation and maintenance of files
- Immediate printouts of files
- Online programming
- Online development of screen displays.

While a more complete discussion of documentation will be found in the section titled "System Documentation," it is important to emphasize the contribution of online documentation to design and development activities. In the early months of the project, when advisory committee members were travelling considerable distances to attend meetings, it was invaluable to be able to take advantage of the features of immediate printouts of files and

online development of screen displays. Thus, project staff were able to prepare "reaction papers" and screen displays in advance and then, with committee members grouped around a terminal, solicit advice and make immediate changes to screens. At the completion of a day's work, each member could receive a printout of all changes which had been made during the day, allowing further work in separate small groups, or individually at home.

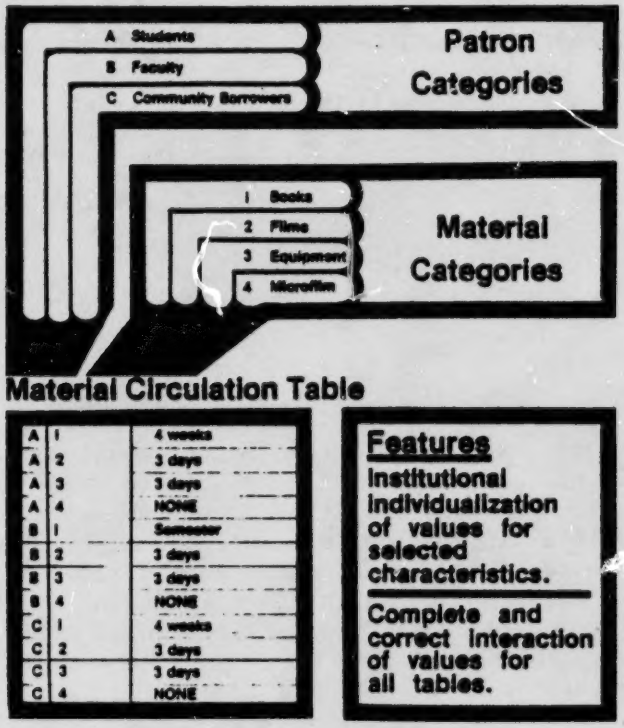

Table 3 - Table Concept

Other important design considerations included the use of modular programming, COBOL coding and CICS teleprocessing system. Modular programming gives the system flexibility and wide applicability with resulting ease of system modification by individual institutions. Due to the system's medium range capabilities, modular programming was used to lower system overhead. Most program coding used COBOL, which is one of the most commonly used computer languages in the academic environment. The predominant use of COBOL coding eliminates the necessity of specialized programmers for system installation and maintenance. Some selected sub-routines were written in assembler language to provide maximum system efficiency. CICS, a widely used teleprocessing system with command level coding, was used as the terminal management system for online programming. CICS allows maps to be used in screen design, thus facilitating screen updating.

Explanation of System Configuration

Examination of the technical configuration of the system should include a description of all hardware and software necessary to support the system. Since the project included online programming and development at the same time other online applications were in operation at the host institution, it is also important to include a discussion of other applications at Elgin Community College.

Elgin installed its IBM System/370 Model 125 in 1975 as a joint venture with the Elgin Public School System. The college and public school system shared both the expense and computing power of the Model 125 while each controlled its own operations and maintained its own independent software and peripherals. A 3704 communications controller permitted the remote entry of administrative and student batch jobs for the public school system.

The data processing center served a strong instructional program in data processing at Elgin Community College, as well as an online student and registration record system. Other areas of the college received extensive batch report services. Twenty-two IBM Model 3277 terminals served the LRC system, as well as other applications at the college. Two direct access storage facilities - a 3340 and a 3344 - provided a total of 840 megabytes of disc storage, of which about 140 megabytes were devoted to the LRC data bases. The six partitions on Elgin's Model 125 were controlled by the disc operating system/virtual storage extended DOS/VSE. The telecommunications interface between the operating system and the LRC programs was provided by the IBM customer information control system (CICS). IBM's data base management system, data language/one (DL/1) provided the data base structure and contributes to system flexibility. Item identification was accomplished through a Model 130 OCR wand reader manufactured by Recognition Equipment, Inc. This reader connected directly to the Model 3277 terminals.

Machine Readable Identification System

An extensive amount of time and energy was directed toward the issue of suitable machine readable labels for item identification. This issue was identified as a problem area in the August, 1978 interim report, and project staff noted that resolution of this issue was critical. Project staff solicited input from numerous vendors, independent consultants, and a systems design firm. Special Systems, Inc. This company was hired to conduct a feasibility study regarding interface of bar code technology with IBM terminals.

Project staff had written correspondence or telephone conversations with representatives of the following companies:

Bob Manning
Recognition Equipment, Inc.
Dallas, Texas
Phone - 214/438-8611

James Hoel
Computype
Minneapolis, Minn.
Phone - 612/884-7704

Stuart Nelson
Systems Concepts, Inc.
320 3rd Street
San Francisco, CA 94107
Phone - 415/442-1500

Nick Buta
Trivex, Inc.
1302 W. 22nd St.
Oak Brook, Executive Plaza
Suite 501
Oak Brook, IL 60521
Phone - 312/325-8108

John Hay
Telex
Chicago Office
Phone - 312/298-9800

Byron Gorres, Ext. 229
3-M Corporation
Library System Division
St. Paul, Minn. 55101
Phone - 612/633-9400

Frank Jones
Interface Mechanisms
P. O. Box N
Lynn, Washington
Phone - 206/743-7036

Bill Garippo, Systems Manager in Marketing
Max Holder
Monarch Marking Systems
Dayton, Ohio
Phone - 513/805-2211

Pat Sharkitt
Dick Hayden
Special Systems, Inc.
Silver Springs, Maryland
Phone - 301/587-2260

Tim Mahe
Control Data
Minneapolis, Minnesota

Loy Metika
Courier Terminals
Chicago Office
Phone - 312/920-2770

Gary Kolesiak
Memorex Corporation
Chicago Office
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Bob Cihlar, Regional Manager
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While recommendations from consultants pointed heavily toward Code-a-bar type bar code technology, staff research led to the decision to adopt optical character recognition technology for item identification. Factors related to this decision included:

- Lack of suitable ASCII/EBCDIC coding interface to connect bar code technology with IBM terminals

- Inability of bar code equipment vendors to support design and development effort for accomplishing such interface

- Unacceptability of other bar code technology (Delta distance-A-code, Code-39, UPC, etc.) in a library environment.

The use of OCR-A format labeling, which is human readable, offers numerous advantages for the user libraries. It increases accuracy as the possibility of error is greatly reduced. Reliability is a benefit because the OCR-wanding operation has built-in controls which assure that character substitutions cannot occur. The simplicity and speed of the wanding process also enhances the productivity of users. And because the labels can be permanently affixed to library materials, the coded information regarding each item cannot be easily lost. In addition, the inventory function is facilitated by machine-readable labels. Flexibility of production, too, is an advantage of OCR-A labeling, as it offers the possibility of either in-house production or commercial manufacture. Local production allows for ease of maintenance, while commercial production results in labels of greater durability.

With the decision to use OCR labels for item identification, two companies were identified to assist with providing equipment and preparing labels. Suitable equipment was obtained from Recognition, Equipment, Inc., Dallas, Texas, and label design and manufacture were obtained from Computype, Minneapolis, Minnesota. Representatives met with project staff to resolve questions of character sets, check digits, size, and quantity of labels.

A closely related issue concerns borrower identification through the use of some form of identification card. Initial discussions with NILRC advisory committee and outside consultants pointed to the desirability of machine readable borrower ID cards for a complete system. It was noted that use of borrower ID cards speeds activities at the circulation counter and provides a level of accuracy significantly greater than keyed entry of borrower information.

A number of negative factors related to the use of borrower ID cards were also noted. Several of the major factors are:

- Cost

- Lack of value placed on borrower ID cards by other departments within the college. In the past, this factor had led to transfer of ID cards, unauthorized use of ID cards and the constant need to replace lost cards.

- Irregular issuance at registration with special problems related to telephone registration.

- The relatively transient nature of the community college student population with a large number of part-time students and community borrowers.

Consequently, it was decided to design the system to accommodate borrower ID cards but to proceed with a prototype at Elgin Community College which utilized keyed entry of borrower ID numbers.

Conversion Activities

Introduction. One of the most important and time consuming phases of implementing an automated system is the conversion of information into a machine readable form. From a research and development perspective, one of the major contributions of this project was its innovative use of the card catalog division of the Library of Congress in assisting with the conversion process.

Representatives from the Library of Congress worked closely with project staff members in developing specifications to be followed. Mr. Bernard J. Segel, in particular, was instrumental in assisting with details on this part of the project. The staff agreed to provide a test tape of approximately 500 records of monographic items. Appropriate programming was completed for online conversion at the host site and a test file allowed staff to eliminate minor bugs. Specifications used for the first test

tape were as follows:

Standard Labels
9 Track 1600 BPI EBCDIC
80 characters per record 1 record per block

POSITION	FIELD	DESCRIPTION
1 - 3	PREFIX	ALPHA (forced to upper case), left justified with right blank fill; all blanks if no prefix.
4 - 5	YEAR	NUMERIC, Note: The hyphen appearing in printed card numbers following the YEAR field is not included.
6 - 11	SERIAL NO.	NUMERIC, right justified with left zero fill BLANKS.

Two major types of activities comprised the conversion process - one, physical conversion to the data base system, and two, internal conversion (from Library of Congress MARC tapes) for initial data file construction. Initial item file construction involved the input of information through both batch and online processes. An alternative to this two-step process allows libraries with OCLC (Ohio College Library Center) historical tapes to directly create an item data file without the physical conversion step. Both parts of the conversion are graphically illustrated in Tables 4 and 5.

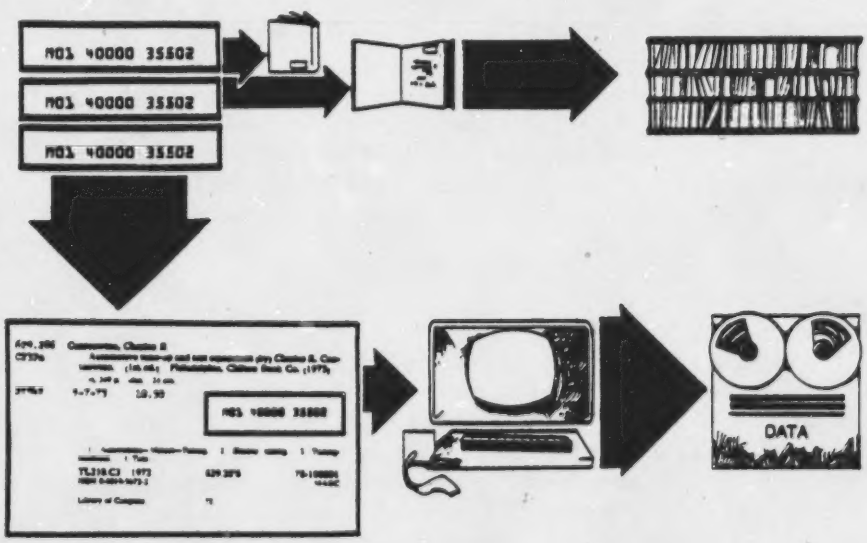


Table 4 - Physical Conversion

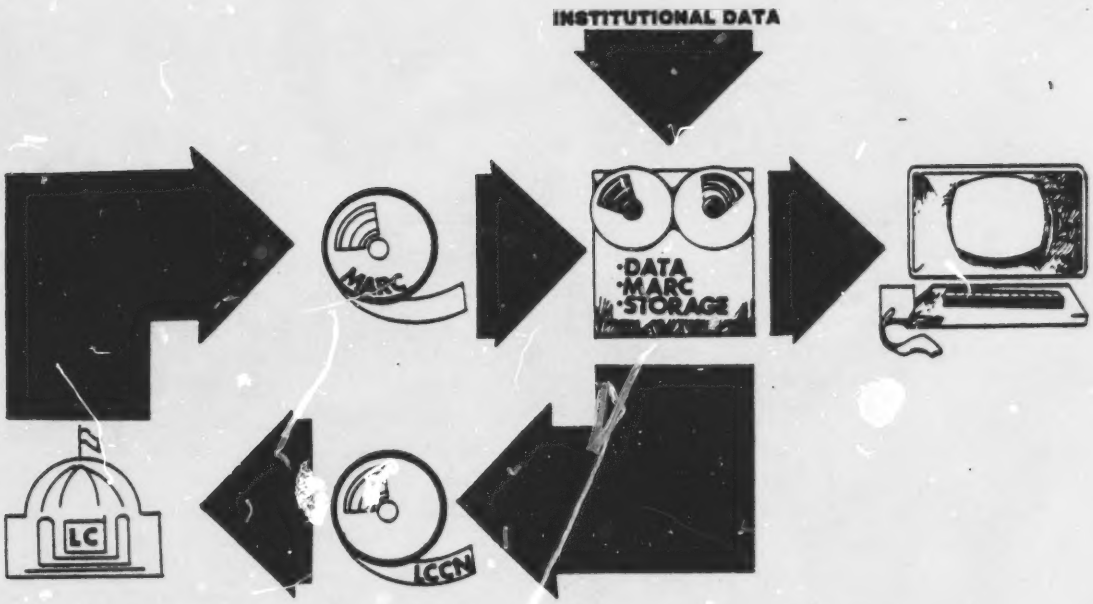


Table 5 - MARC Conversion

A number of programs were included to facilitate a conversion process which was both efficient and flexible. Allowing for immediate implementation and start up, the system minimized costs considerably by enabling libraries to begin utilization of programs at the onset with limited bibliographic information.

One important feature of the design was the error-checking capabilities of the conversion programs. It alerted the operator to the possibility of errors by blocking the input for some specific errors and highlighting those errors on the screen. Additional batch programs were written to provide a final check of the conversion information before mailing to Library of Congress. Another batch program was written to insure that the return mailing of MARC records was correct with respect to the information sent out.

Physical Conversion

Actual physical conversion commenced with the ordering and receipt of the OCR label sets, each consisting of three identical labels. No intrinsic significance was held by these numbers, thus eliminating the need to match an item from the collection with a specific label during the conversion process. Such matching would necessitate inefficient handling of materials in a specific order (by accession number, for example) or in a particular manner (by call number).

An inventory process followed the receipt of OCR labels in which each shelf list card was matched to the corresponding item in the library's holdings. Labeling of materials occurred at this time, with one label placed on the shelf list card and two on the item. Missing information is added to the shelf list card or inaccurate information was corrected if necessary.

The labeled library item was then returned to the shelf and the shelf list card containing the label and all necessary information for conversion was given to a terminal operator who entered the data into the system. Such input was achieved by OCR wanding of the item label and by keying of pertinent information from the card.

Item Information Input

The amount and type of information keyed into the system at the initial stage of the conversion process can vary as each institution determines what data to enter. For example, partial title, author, LCCN or OCLC number are required at this point. Other information that cannot be recovered from other sources, such as purchase price/date, institutional location, and collection code must also be entered here.

However, other bibliographical information need not be keyed into the system at this time. Such an institutional decision is based on whether to immediately key in all data or later retrieve the majority of data from Library of Congress, utilizing MARC data or from OCLC historical tapes.

It should be emphasized that skeletal information input enables the system to be operational. Complete bibliographical data does not initially need to be entered into the item file in order for an item to circulate.

MARC Conversion

The second phase of initial data file construction consists of the internal conversion process. For MARC conversions, LCCN's are first collected from the skeletal item data base that has been constructed. A request tape containing these LCCN's is then sent to the Library of Congress. Here the LC MARC system processes the tape containing the required LCCN's, matches it against their data bank, and retrieves the corresponding MARC records. These MARC data records are returned and processed by CALS programs. In this way, the data base is updated with selected information from the MARC record.

Programming Modules

Programming activities began approximately five months after the start of the project and continued for the remainder of the project funding period. Major attention was directed toward online programs, particularly those associated with conversion, borrower records, and monographic circulation routines. Batch programs were written to support these online functions.

The following list highlights those programs which had been completed or were in some stage of testing at the completion of the funding period:

- Conversion

  - Master Tape Reformat
  - Batch Initialization of the Item File
  - Update Item Data Base
  - Build Batch Item Data Base Header Record
  - Build LC Request Tape
  - Convert MARC ASC II to EDCIDIC
  - Print MARC Formatted Records
  - Merge New MARC to MARC Master

- General Operation

  - Main Menu
  - Batch Data Base Listing Program
  - Batch Borrower Data Base Build
  - Batch Item Data Base Formatted Print
  - Batch Test Item Data Base Utility Program
  - Dictionary Listing Program - Utility
  - Batch Borrower Data Base Formatted Print

- General Reports

  - Acquisitions Report by Type
  - LRC Collection by Accession Number
  - Extract Collection Data
  - LRC Collection by Call Number
  - LRC Collection by Accession Number
  - LRC Collection by Collection by Call Number
  - LRC Collection by Title
  - LRC Collection by Title Within Author
    by Entry Code Type
  - Extract, Sort and Print by Call Number Range
    by Collection Range
    by Entry Code Range
  - Withdrawn, Missing, Lost Items
  - Subject Bibliography

- Circulation

  - Check Out Item With Display
  - Check Out Item
  - Check In Item
  - By Borrower Within Status
  - Borrowers With Overdue Items
  - Overdue Items by Date

- Serials/Holdings

  - Display/Update Serials Holding Record
  - Serials Holdings Check In
  - Periodical Listing by Title
  - Periodical Listing by Vendor
  - Periodical Renewal List

- Scheduling

  - Schedule/Check Out Equip/Film
  - Display All Equip/Film and Status by Req/Type
  - Display/Update Rental Request
  - Daily Schedule (Equipment)
  - Equipment Scheduling Notice
  - Equipment Scheduling Report by Department
  - Equipment Use Profile by Item
  - Film Rental by Borrower
  - Film Rental by Date
  - Film Rental by Department/Division
  - Film Rental Cost Comparison
  - Film Rental by Purchase Order Number
  - Film Rental by Vendor
  - Material Preview List by Title

- Production Records

  - Production Record Display/Update
  - Production Record Add
  - Job List Display
  - Job List (Unassigned) Display
  - Display/Add to Supplies Table
    Productions by Date by Department by Requestor
  - Productions by Date Department Summary
  - Productions by Table Entry Number

- Statistics

  - Items Which Have Not Circulated
  - Usage by Time Range by Item or Range
  - Circulation by Range Within Last Semester
  - Interlibrary Loan Count
  - Circulation Count by Time Range

- Notices

  - Book Available Notice
  - Book Inventory Notice
  - Overdue Notice
  - Serial Claim
  - Film Arrival Notice
  - Film Overdue Notice (Rental Film)
  - Film Rental Confirmation

- Borrower Information

  - Display/Update Borrower Information
  - Add Borrower Information
  - Delete Borrower Information

- Item Maintenance

  - Update/Add Item Record
  - Add Monograph Volume Segment
  - Add Monograph Copy Segment
  - Update Monograph
  - Add Equipment Volume Segment
  - Add Equipment Copy Segment
  - Update Equipment
  - Add Serials Copy Segment
  - Update Serials
  - Add Serials Volume Segment
  - Delete Item Record
  - Display Item Record
  - Add/Update/Display Tracings
  - Add/Update/Display Notes

- Retrieval System

  - Title Entry Search
  - Author Entry Search
  - LCCN
  - Circ ID
  - LC Request Tape
  - Read/Convert ASCII to EBCIDIC
  - New (MARC) Master Merge to Old MARC Master
  - Print Borrower Data Base
  - Print Item Data Base
  - Sort/Print of LCC Request Tape

System Documentation

Project documentation relied heavily upon a commercially available software package called SPM II. SPM II offers the following features:

- Online creation and maintenance of files
- Immediate printouts of files
- Online programming
- Online development of screen displays.

This software package became a particularly convenient tool during the design and development stage of the project. At this time, members of the advisory committee could meet around a computer terminal during work sessions. At the end of a day's work, each member could receive a printout of all changes which had been made during the day, allowing further work in small groups or individually at home.

During the early part of the project, staff members established the groundwork which future documentation would follow. Several separate files were created under SPM II, each with a specific function. Some files, such as screen displays and specifications, changed frequently during the early design and development stages, but later stabilized in content. Other files, such as terminal operator manuals and copybooks were outlined and left to be completed as more information became available. When files were used infrequently, they were maintained in a "compressed" form to minimize overhead to the system. Samples of some of the files are included in the Appendix.

Explanation of Batch Report Features

With the technical design of the system oriented toward online interactive operations, project staff directed most programming and testing efforts toward online functions. However, offline or batch programs were also included in design and development activities to provide direct support to online functions. Generated automatically or on demand, these batch reports include notices, statistics, and printouts of management information. The decision to use a data base management system (described in the section titled "Significant Design Considerations") was of particular importance to programming for batch functions because it provided a level of integrity for data elements that significantly enhanced batch programming. The concept of modular programming is important, too, in that it allowed programmers to "cannibalize" major sections of a given program to use in other programs.

The NILRC advisory committee was instrumental in helping project staff to identify all necessary batch programs. More importantly, they assisted in identifying specific data elements which would be required for each report, and determining the proper number of characters for each field of information. Finally, they worked closely with project staff to develop the actual design of notices and reports.

It should be emphasized that actual programming and testing for batch functions during this time period was limited to that necessary to support online functions being developed. These programs were related to borrower and conversion transactions. However, extensive design and development was completed in this area and the following list is representative of the breadth of design for batch support:

Notices

- Book available notice to borrower
- Overdue notice to borrower
- Serial claim notice to vendor
- Film rental confirmation to borrower
- Film overdue notice to borrower
- Film arrival notice to borrower

LRC Holdings

- LRC holdings by accession or call number, title, author or entry code
- Withdrawn, missing, lost items by collection

Serials Holdings/Check-In

- Periodical listing by title
- Periodical listing by vendor
- Periodical renewal list

Scheduling

- Daily equipment schedule
- Equipment scheduling by department
- Equipment use profile by item
- Film rental by borrower, date, department/ division, or purchase order number
- Material preview list by title

Production Records

- Productions (completed and pending) by date and department
- Production list by job

Statistics

- Items which have not circulated
- Circulation reports

Table 6 illustrates the intended design of the "notices" form. As a standard preprinted form, this design (and much of the programming) would accommodate other functions, such as claim and arrival notifications.

FROM:
RENNER LEARNING RESOURCE CENTER
ELGIN COMMUNITY COLLEGE
1700 SPARTAN DRIVE
ELGIN, ILLINOIS 60120

LRC 1860
06/30/84

DUE	CIRC ID	TITLE	FINE
05/09/84	01 40000 51321	CHESAPEAKE	5.25
05/09/84	01 40000 51843	CHESAPEAKE RIVER AND ITS TRIBUTARIES	5.25
06/20/84	01 40002 63729	DRUMS ALONG THE CHESAPEAKE	5.00

TOTAL NOW DUE 15.50
539627849

OVERDUE NOTICE

PLEASE RETURN THESE MATERIALS TO
THE LRC AS SOON AS POSSIBLE

TO:
JOHN DOE
123 FAIRVIEW LAND
COLLEGETOWN, ILLINOIS 123456

Table 6 - Sample Notice Form

Dissemination Activities

Dissemination activities during this time period took place primarily within the NILRC consortium. Project staff prepared a slide series which could be used for demonstration purposes. The slide series proved to be invaluable as a communication tool. It allowed the project director and systems analyst to describe and illustrate aspects of:

- Background and role of the NILRC organization

- Unique features of the NILRC computer system

- Design and development activities

- Programming and testing activities, and

- Simulated system demonstration.

The first modules of programming were demonstrated to data processing directors and LRC personnel from NILRC institutions in late November. At that time, selected modules of the borrower data base and monographic item data base were demonstrated. The first modules of circulation programming were also examined. Screen displays, data base file layouts and a notebook of batch report layouts were shared with the group.

As additional work on the project was completed, additional demonstrations were scheduled. One such demonstration, scheduled for March 2, 1979, was oriented toward community college data processing directors. Another, scheduled for May 30, 1979, was oriented toward public and school library personnel and learning resource center people from the community college environment. In addition to using the previously prepared slide presentation, the agenda for these meetings included a discussion of:

- Machine readable labels

- Conversion activities

- Batch reports and documentation

- Programming and systems demonstration

  . Main menu

  . Borrower add/update

  . Monographic and equipment add/update

  . Monographic check-out/check-in

  . Verification of check-out on item screen

  . OCR scanning routine

During the month of November, the systems analyst also made a presentation to a group of technical services personnel and LRC administrators representing the five campuses of Northern Virginia Community College.

The dissemination plan also included preparation of articles for publication and journals. While no articles were published during this time, the necessary planning was accomplished, and drafts were submitted during the subsequent funding period. The staff also completed plans for an extensive management overview of the system. Once again, while the publication was not completed during this time period, most of the decisions regarding format and content had taken place.

PROBLEMS ENCOUNTERED

Assessment of the project at the completion of the first phase of project activity revealed two problem areas which should be described in this final report. The first problem is related to the magnitude of the task as it was originally envisioned, and the second is related to staffing.

It would be difficult to overemphasize the complexity of automation for online interactive applications within the learning resources environment. This is particularly important when one realizes that computer power and storage are finite resources. Planning a comprehensive system such as this to work efficiently within the constraints of a "medium size" community college data processing operation demanded design and development efforts far in excess of what had originally been planned.

It was felt that the objectives, as stated in the funding proposal and cited in the introduction to this report, were unrealistic in terms of the time available and the technical approach followed. The second objective, related to "developing and documenting six computer programs", changed considerably with the technical approach followed. While design and development were still oriented toward these functional services, the system actually required well over one hundred programming modules. The section titled "Programming Modules" outlines those which had been completed or were being tested at the end of the project. Other objectives, likewise, were set back by the increased time spent in design and development.

The second problem area was related specifically to programming staff. While the project director and systems analyst were pleased with the level of support and assistance provided by the members of the NILRC consortium, it became clear that additional programming staff was necessary to implement the design. The complication in this matter was that a very high level of skill was required. Programmers had to be familiar with data base management systems (DL/1), and the telecommunications system being used (CICS).

Finally, while it wasn't expected that a programmer would be well versed in learning resources operations, training time was devoted to familiarizing them with operations on which they were programming. Programming so that a system operates efficiently, and yet allows others to easily follow the logic string, is a challenging task. In short, "quick and dirty" programming for local applications is significantly different from fully documented programming oriented toward mass consumption.

APPENDIX A

REQUIREMENTS FOR BATCH REPORTS

I.8.2

PROGRAM NAME: BORROWERS WITH OVERDUE ITEMS
PROGRAM ID: LRE0540
FUNCTION: TO PROVIDE A LIST OF ANY BORROWERS THAT CURRENTLY POSSESS OVERDUE ITEMS.
USAGE EXAMPLE:
FORMS: STANDARD.
NO. OF COPIES: 1
WHERE PRINTED: DATA CENTER.
FREQUENCY:
REQUESTOR:
DATA ELEMENTS: BORROWER NAME
BORROWER SSN
ITEM ACCESSION NUMBER
ITEM TYPE CODE
ITEM DUE DATE
ITEM DUE TIME
ITEM TITLE/DESCRIPTION
DATA BASE/SEGMENTS:
BORROWER DB/LRPBROT,LRSBLRC,LRSBACT
ITEM DB/LRPMCPY,LRSMTTL
TRANSACTION DB/LRPTROT,LRSTCIR
TABLES:
PROGRAM NOTES: OVERDUE ITEMS DETERMINED BY COMPARING DUE DATE WITH CURRENT DATE.
A BORROWER IS LISTED IF: (1) HE HAS AN ITEM THAT IS STILL OVERDUE OR (2) HE HAS RETURNED THE ITEM BUT STILL HAS AN OUTSTANDING FINE. IN THE LATTER CASE, THE TOTAL FINE DUE IS ALSO PRINTED. SORT IS BY SSN WITHIN NAME.

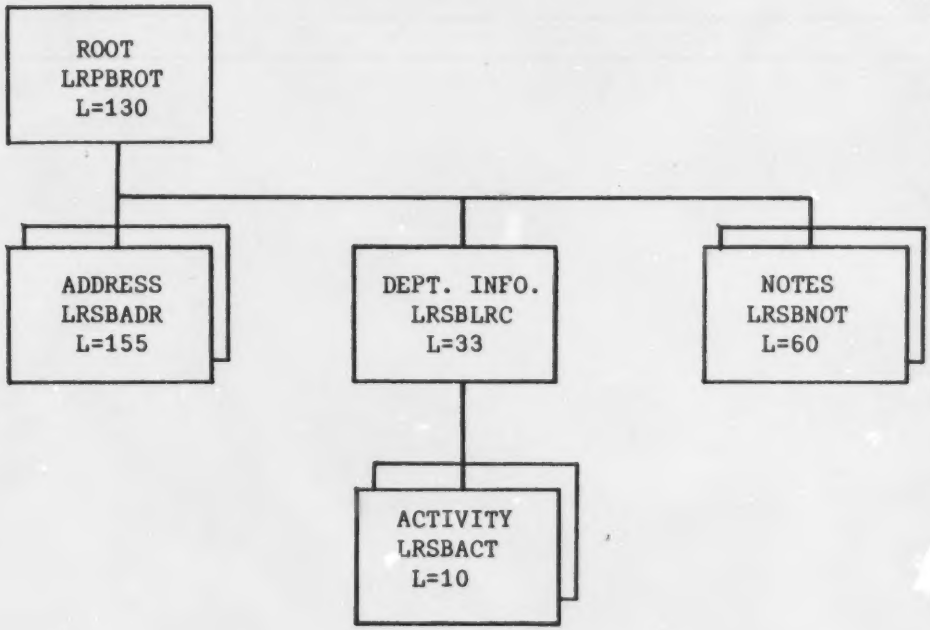
APPENDIX B

BORROWER DATA BASE LAYOUT

CALS

BORROWER DATA BASE

COMPREHENSIVE AUTOMATED LEARNING RESOURCES SYSTEM



APPENDIX C

COPY BOOK FOR BORROWER ROOT SEGMENT

CALS

BORROWER DATA BASE
LRPBROT - ROOT SEGMENT

COMPREHENSIVE AUTOMATED LEARNING RESOURCES SYSTEM

```
C.LRPBROT      V.M 0.0          9 BLOCKS          SYSTEM SOURCE-STATEMENT LIBRARY

       BKEND   C.LRPBROT

      *  ELGIN COMMUNITY COLLEGE
      *  BORROWER ROOT SEGMENT  V.0 M.0  -ROOT LEVEL ONE-
      *
      *-----------------------------------------------------------------*
      * DL/1 SEGMENT NAME = LRPBROT, SEGMENT KEY= LRQBROT, LNGTH= 130 *
      *-----------------------------------------------------------------*
       01  BORROWER-ROOT-SEG.
           05  BORROWER-KEY-FIELD.
               10  BORR-VENDOR-CODE          PIC X.
                   88  BORROWER-KEY-TYPE     VALUE 'B'.
                   88  VENDOR-KEY-TYPE       VALUE 'V'.
                   88  PUBLISHER-KEY-TYPE    VALUE 'P'.
               10  BORR-ID-NUMBER.
                   15  BORR-ID-L4            PIC X(4).
                   15  BORR-ID-M2            PIC X(2).
                   15  BORR-ID-F3            PIC X(3).
           05  FILLER                        PIC X(6).
           05  BORR-SURNAME-TITLE            PIC X(4).
           05  BORR-NAME                     PIC X(24).
           05  BORR-DATE-BORN                PIC S9(6) COMP-3.
           05  BORR-ADDR-COUNT               PIC S9(1) COMP-3.
           05  BORR-NOTES-COUNT              PIC S9(1) COMP-3.
           05  BORR-STATUS-FIELD.
               10  BORR-STATUS               PIC X(2)
                                             OCCURS 10 TIMES
                                             INDEXED BY IX-BORR-STATUS.

           05  BORR-HOLD-FIELD.
               10  BORR-HOLDS                PIC X(2)
                                             OCCURS 10 TIMES
                                             INDEXED BY IX-BORR-HOLDS.

           05  BORR-DEPARTMENT-FIELD.
               10  BORR-DEPARTMENT           PIC S9(15) COMP-3
                                             OCCURS 5 TIMES
                                             INDEXED BY IX-BORR-DEPT.

       BKEND
```

APPENDIX D

VISUAL LAYOUT OF BORROWER ROOT SEGMENT

CALS

COMPREHENSIVE AUTOMATED LEARNING RESOURCES SYSTEM

SYSTEM/SUBSYSTEM	RECORD NAME	RECORD SIZE	DATE	PAGE ___ OF ___
BORROWER DATA BASE	LRPBROT	130	10/26/78	

RECORD DESCRIPTION: BORROWER ROOT SEGMENT

	TYPE	NUMBER L4	NUMBER M2	NUMBER F3	FILLER	TITLE	BORROWER NAME	BIRTH DATE	ADR CNT	NOT CNT	STATUS 1	STATUS 2	STATUS 3	STATUS 4	STATUS 5
	1	5		10	15	20	25 30 35 40	45		50			55		60
*	C	C	C	C	C	C	C	P	P	P	C	C	C	C	C

						HOLDS										DEPARTMENT			
	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4
	61		65		70			75		80			85		90	95	100	105	110	115	120
	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	P	P	P	P		

		5		
	121	125	130	135 140 145 150 155 160 165 170 175 180
	P			

181 185 190 195 200 205 210 215 220 225 230 235 240

45 46

241 245 250 255 260 265 270 275 280 285 290 295 300

* FIELD TYPE: B - BINARY C - CHARACTER P - PACKED

APPENDIX E

EXPLANATION OF FIELDS WITHIN BORROWER ROOT SEGMENT

CALS

BORROWER DATA BASE
LRPBROT - ROOT SEGMENT

COMPREHENSIVE AUTOMATED LEARNING RESOURCES SYSTEM

LOC	COBOL FIELD	FIELD DESCRIPTION	FORMAT	INITIAL VALUE
1	BORR-VENDOR-CODE	CODE FOR TYPE OF ENTRY B - BORROWER V - VENDOR P - PUBLISHER	X(1)	BLANK
2-10	BORR-ID-NUMBER	BORROWER ID NUMBER STORED AND ACCESSED AS LAST 4 CHARACTERS, MIDDLE 2 CHARACTERS, FIRST 3 CHARACTERS	X(9)	BLANK
11 - 16	FILLER		X(5)	BLANK
17 - 20	BORR-SURNAME-TITLE	TITLE FOR BORROWER (MR., MRS., MS.)	X(4)	BLANK
21 - 44	BORR-NAME	BORROWER NAME LAST FIRST MI QUALIFIER (JR.)	X(24)	BLANK
45 - 48	BORR-DATE-BORN	BIRTHDAY (MUST BE ENTERED FOR BORROWER BUT NOT VENDOR OR PUBLISHER) (YYMMDD)	S9(6)COMP-3	ENTRY DATE
49	BORR-ADDR-COUNT	COUNT OF ADDRESS SEGMENTS	S9(1)COMP-3	0
50	BORR-NOTES-COUNT	COUNT OF NOTES SEGMENTS	S9(1)COMP-3	0
51-70	BORR-STATUS	STATUS OF BORROWER (VERIFY FROM BORROWER STATUS TABLE)	[10]X(2)	BLANK
71 - 90	BORR-HOLDS	HOLDS PLACED BY INSTITUTION (VERIFY FROM HOLD TABLE SECURITY REQUIRED TO PLACE)	[10]X(2)	BLANK
91 - 130	BORR-DEPARTMENT	INSTITUTION DEPARTMENT (IN HEGIS CODE) TO WHICH BORROWER IS RESPONSIBLE	[5]S9(7)COMP-3	ZEROS

APPENDIX F

EXPLANATION AND LAYOUT OF LOCATION CODE TABLE

ELGIN
COMMUNITY
COLLEGE

ELRTABL1 - MATERIALS DESCRIPTION

LOCATION CODE TABLE

VII.B.1.8 LOCATION CODE TABLE

THE LOCATION CODE TABLE CONTAINS CODES INDICATING THE LOCATIONS (I.E. BUILDING) IN WHICH AN ITEMS CAN BE FOUND ALONG WITH A DESCRIPTION OF EACH LOCATION CODE. THE LOCATION CODE IS FOUND IN THE COPY SEGMENT OF THE ITEM DATA BASE AND IS VERIFIED AGAINST THIS TABLE UPON DATA ENTRY. IT CAN BE USED TO SEPARATE REPORT LISTINGS FOR INVENTORY OR FOR STATISTICS PERTAINING TO THE SEPARATE LOCATIONS LISTED. IT IS USED IN THE CIRCULATION PROGRAMS TO ALLOW DIFFERENT CIRCULATION RULES TO APPLY TO DIFFERENT LOCATIONS THROUGHOUT THE INSTITUTION.

TABLE ENTRY NAME: LCC

KEY: LCC-CODE

FORMAT:

```
*       01  LOCATION-CODE-DSECT.                              *
*           05  LCC-CODE                    PIC X(2).         *
*           05  LCC-CIRC-CODE               PIC X(3).         *
*           05  LCC-DES                     PIC X(20).        *
*           05  FILLER                      PIC X(3).         *
```

EXAMPLES:

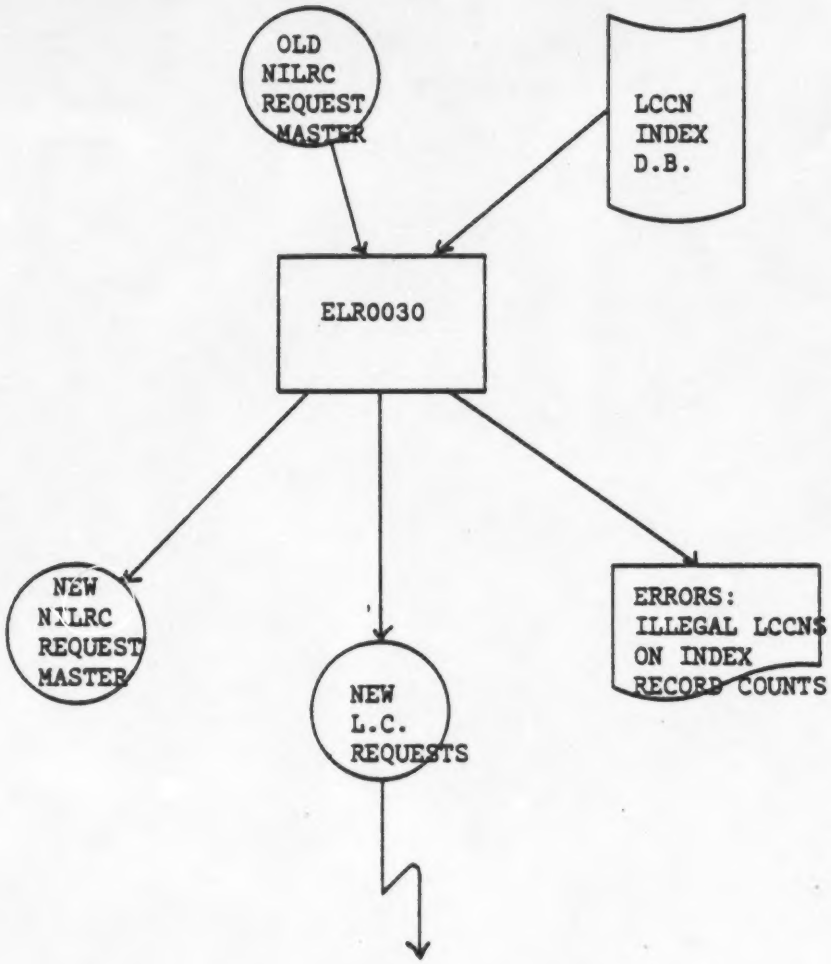
CODE	CIRC CD	DESCRIPTION
NL	001	NURSING LAB
	001	RENNER LRC
PL	001	PLASTICS LAB
ML	001	MATH LAB
SL	001	SECRETARIAL LAB
NA	000	NORTH ANNEX
GY	000	GYM
VT	000	VOCATIONAL/TECH
SC	000	2ND FLOOR MAIN BLD
CW	000	C-WING
BW	000	B-WING
CP	000	COPA CENTER

APPENDIX G

SYSTEM FLOWCHART FOR MARC CONVERSION

ELGIN COMMUNITY COLLEGE

MARC TAPE CONVERSION SYSTEM FLOWCHART

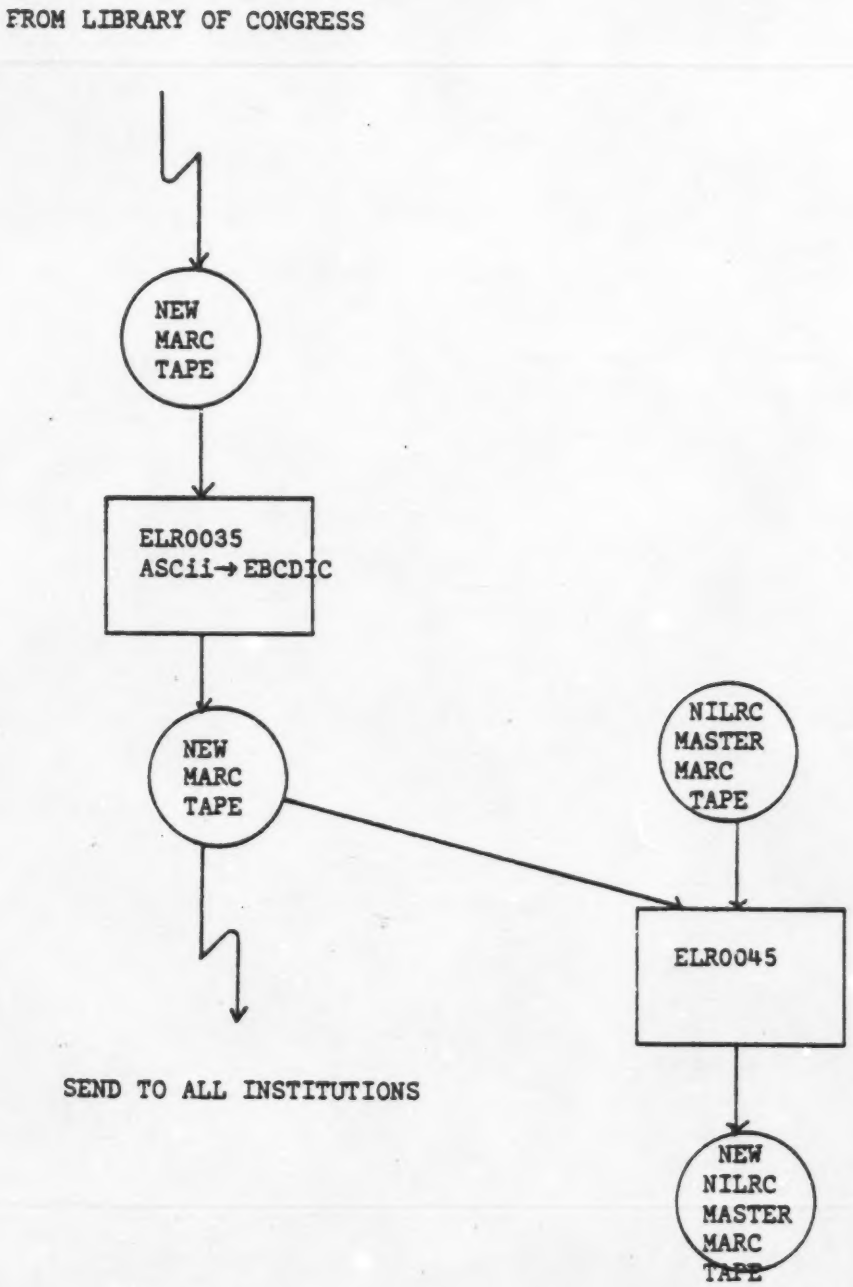


SEND TO LIBRARY OF CONGRESS

REQUEST TAPE	=	CARD IMAGES LCCN'S

ELGIN COMMUNITY COLLEGE

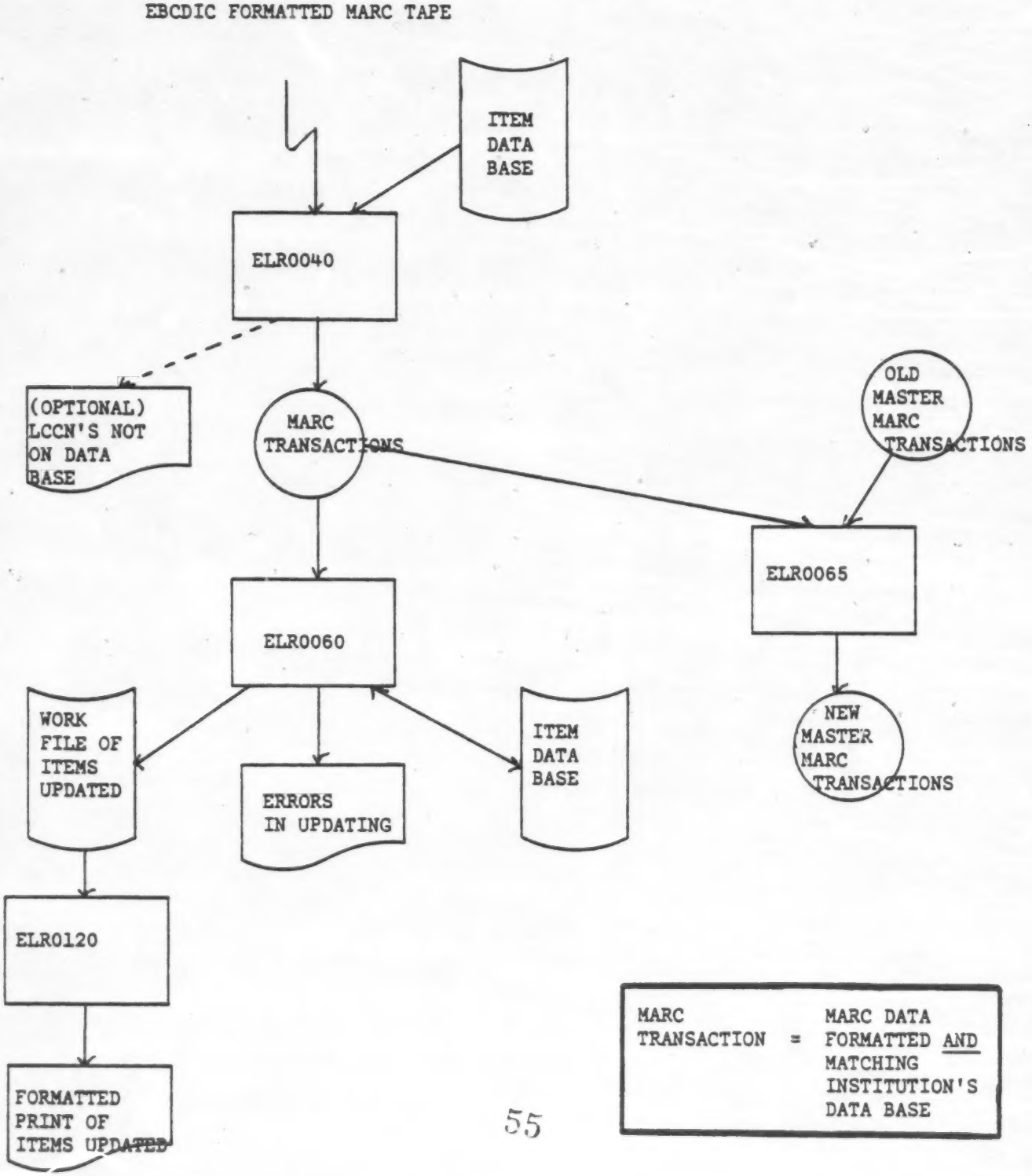
MARC TAPE CONVERSION SYSTEM FLOWCHART



MARC TAPE = RAW MARC DATA FROM L.C.

ELGIN COMMUNITY COLLEGE

MARC TAPE CONVERSION SYSTEM FLOWCHART



APPENDIX H

DRAFT OF BORROWER SCREEN MAP

IBM

3270 Information Display System
Layout Sheet

Panel ID: ELRMBMU
Job No.:
Originated by: Dee Brooks
Sheet: 1 of 1
Date: 3/30/79
Subject: Borrowers Add & Update Screen

COLUMN

	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80
	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
01	LBMA XXXX	SSNXXX		XXXSSN	NXXX			
02			MXXX	XX		XX		XXXXXXXX
03	STREET:	XX		X	CITY:	ELGIN		STATE: IL
04		XX		X	COUNTY CODE:	NNN	ZIP:	NNNNN
05		XX		X	PHONA:	NNN NNN-NNNN		EXT: NNNN
06	BUSINESS:	XX		X	CITY:	XXXXXXXXXXXXXX		STATE: XX
07		XX		X	COUNTY CODE:	NNN	ZIP:	NNNNN
08		XX		X	PHONE:	NNN NNN-NNNN		EXT: NNNN
09		XX		X				
10	DEPARTMENTS:	NNN-NNN-NNN	XXXXXXXXXXXX		XXX	NNN-NNN-NNN	XXXXXXXXXXXXXX	
11		NNN-NNN-NNN	XX		XX	NNN-NNN-NNN	XXXXXXXXXXXXXX	
12		NNN-NNN-NNN	XX	480	XX			960
13	STATUSES:			M.C.O.: NNNN		SAVES: NNN	O.D. MATRL:	NNNN
14	XX	XXXXXXXXXXXXXXXXXX						
15	XX	XX	X	XX	XX	XX	XX	XX
16	XX	XX	X	XX	XX	XX	XX	XX
17	XX	XX	X	XX	XX	XX	XX	XX
18	HOLDS:							
19	XX	XX	X					
20	XX	XX	X	XX	XX	XX	XX	XX
21	XX	XX	X	XX	XX	XX	XX	XX
22	XX	XX	X	XX	XX	XX	XX	XX
23	NOTES:	XX					X	X
24	57							

APPENDIX I

SAMPLE PROGRAM DOCUMENTATION

```
      1  IBM DOS VS COBOL                                  REL 2.5 + PTF51  PP NO. 5746-CB1

 CBL SEQ,FLAW,SUPMAP,SPACE1,NOSTXIT,APOST,NOTRUNC,NOSXREF,FLOW=00,ZWB
 CBL NOSTATE,CSYNTAX,CATALR,NOVERB,NOVERBSUM,NOVERBREF,NOCOUNT,NOLVL
 CBL NOOPT,LIB
 CBL SXREF,CLIST                                                                  0090
00001    000100 IDENTIFICATION DIVISION.
00002    000200 PROGRAM-ID.                        LRE0085.
00003    000300 AUTHOR.                            DEE BROOKS.
00004    000400 DATE-WRITTEN.                      02/02/80.
00005    000500 DATE-COMPILED. 06/09/80.
00006    000600 REMARKS.
00007    000700     UPDATE DATA: XX/XX/XX DESCRIPTION (INITIALS)
00008    000800
00009    000900     PROGRAMS CALLED:              NONE
00010    001000     CALLED FROM:                  NONE
00011    001100     SUBROUTINES USED:             LRWCAN
00012    001200                                   LRWSTAT
00013    001300                                   LRWFTCH
00014    001400                                   LRWFTC2
00015    001500     COPYBOOKS USED:               NONE
00016    001600     MAPS USED:                    NONE
00017    001700     SEGMENTS READ:                NONE
00018    001800     SEGMENTS UPDATED:             NONE
00019    001900     TABLES USED:                  LRTABL1
00020    002000                                   LRTABL3
00021    002100                                   LRTABL4
00022    002200     GENERAL DESCRIPTION:          LRE0085 WRITES TO THE PUNCH QUEUE
00023    002300       CIRCULATION TABLES ENTRIES AND, ON REQUEST PRINTS A
00024    002400       COPY TO ALLOW DESK EDITING OF TABLE FOR LATER ENTRY.
00025    002500
00026    002600       CONTROL CARD INFORMATION: 1)  INSTITUTION ID (NN)
00027    002700                                 2)  PRINT LISTING (NO OR BLANK)
00028    002800                                 3)  WRITE TO PUNCH (NO OR BLANK)
00029    002900
00030    003000                 CONTROL CARD FORMAT:
00031    003100       $NNPPWW
```